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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,571	12/27/2005	Jens A Hansen	H0610.0400/P400	7882
24998 7590 01/13/2009 DICKSTEIN SHAPIRO LLP 1825 EYE STREET NW Washington, DC 20006-5403				
EXAMINER				
SINGH, PREM C				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/562,571

Applicant(s)

HANSEN ET AL.

Examiner

PREM C. SINGH

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SG/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/26/2008 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
5. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ward (US Patent 5,350,501).
6. With respect to claim 1, Ward discloses a process for hydrocracking of hydrocarbon feedstock (See column 11, lines 10-26) into middle distillates (See column 8, lines 26-28) in the presence of hydrogen (See column 11, lines 29-30) by contacting the feedstock with a catalyst comprising a catalyst support, the catalyst support comprising between 2.5 and 10 wt% beta zeolite and between 2.5 and 10 wt% Y zeolite (See abstract, column 8, lines 26-32) at a temperature of 232-454°C and a pressure of 51-238 atm (5.1-23.8 MPa) (See Table I, column 11), the Y zeolite having a unit cell size below about 24.45 Å (See abstract) and a molar SiO₂: Al₂O₃ ratio of 4.5 to 35 (See column 5, lines 47-49), the beta zeolite having a silica-alumina ratio of at least 10 to 500

or more (See column 4, lines 3-8). It is to be noted that the ranges of zeolites, temperature, and SiO_2 : Al_2O_3 ratio for beta zeolite and Y zeolite disclosed by Ward overlap the claimed ranges. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. See *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); Also, see *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

It is to be noted that Ward invention does not specifically disclose middle distillates with aromatic compounds lower than the same fraction contained in the feedstock, however, the invention does disclose that the catalyst of the present process comprises Group VI B and Group VIII metals (See column 8, lines 45-50) and is useful in hydrogenation and dewaxing reactions (See column 7, lines 47-53). Obviously, hydrogenation of the hydrocarbon feedstock will saturate bonds and thus reduce the aromatic content of the middle distillates. Also, dewaxing reaction will reduce the pour point of the hydrocarbon feed. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Ward invention and produce middle distillates in the hydrocracking operation with reduced aromatics and pour point as compared to the feedstock.

7. With respect to claim 2, Ward discloses that Y zeolite has unit cell size preferably between 24.25 and 24.35 Å (See column 5, lines 66-67). In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of

obviousness exists. See *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); Also, see *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

8. With respect to claims 3 and 4, Ward discloses that hydrocracking catalyst further comprises one or more hydrogenation components selected from nickel, cobalt, molybdenum, and tungsten, their oxides and sulfides (See column 8, lines 50-51, 57-61).

9. With respect to claim 5, Ward discloses that the catalyst composition further comprises porous inorganic refractory oxide for example alumina, silica-alumina, silica-magnesia, as well as combination of such materials (See column 6, lines 60-65).

10. With respect to claim 6, Ward discloses that the two zeolites (Y and beta) are in the form of physical mixture (See column 6, lines 56-65; Also see preparation of catalysts 1 through 8).

11. With respect to claim 7, Ward discloses using a hydrotreated vacuum gas oil feed (See column 14, lines 15-24).

Although Ward does not specifically disclose reducing nitrogen and sulfur, it is known to those skilled in the art that hydrotreating is conducted to reduce/remove nitrogen and sulfur compounds to avoid catalyst poisoning in the downstream operations.

Response to Arguments

12. Applicant's arguments filed 11/26/2008 have been fully considered but they are not persuasive.

13. The Applicant argues,

"In view of the above remarks, the subject matter of claims 1-7 would not have been obvious over Ward. The cited prior art reference does not disclose or suggest all limitations of amended independent claim 1. Ward discloses $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratios for zeolite beta of at least 10 and up to about 100, with a preferred range of 10 to 40. The molar ratio of zeolite beta is not indicated in most of the examples, but in example 1 it is as low as 26. Ward states that $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratios of 500:1 or more can be used, though they may have little or no zeolitic properties (see col. 4, lines 3-9). This is contrary to the findings of the claimed invention, where molar ratios of as high as 1500:1 for zeolite beta have been observed to be zeolitically active in low aromatic middle distillate production. Similarly, Ward discloses low $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratios for zeolite Y of preferably 4.5 to 9 and exemplified are values of 5.2 and 5.7 (refer to example 1, preparation of catalysts 2 and 3). Thus, Ward teaches the use of zeolites with low $\text{SiO}_2:\text{Al}_2\text{O}_3$ ratios for both zeolite beta and zeolite Y. A person skilled in the art would not have been motivated by Ward to use zeolite Y with a molar $\text{SiO}_2:\text{Al}_2\text{O}_3$ ratio of at least 15 or zeolite beta with high $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratio of at least 250, since Ward discloses that the former compound preferably uses low molar ratios and the latter compound has little or no zeolitic properties. Thus, Ward teaches away from the claimed invention and does not provide any hint at the synergistic effect observed with respect to reduced aromaticity and improved pour point of middle distillates (as in the claimed process) when using a combination of zeolites beta and Y having the claimed $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratios".

The Applicant's argument is not persuasive because the claim requires $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratio of at least 15 for Y zeolite and at least about 250 for beta zeolite.

Ward discloses Y zeolite having a molar SiO_2 : Al_2O_3 ratio of 4.5 to 35 (See column 5, lines 47-49) and beta zeolite having a silica-alumina ratio of at least 10 to 500 or more (See column 4, lines 3-8).

14. The Applicant argues,

"Amended independent claim 1 also recites a catalyst support comprising 1 to 15 wt % a beta zeolite and 1 to 15 wt % Y zeolite as being suitable for carrying out the inventive process. Ward also mentions low concentrations of 5 to 50 wt % of combined amounts of zeolite beta and zeolite Y as being suitable for selectively producing middle distillates (refer to col. 8, lines 26 to 44). However, in all the examples, a total zeolite amount of 64% is used, resulting in a catalyst acidity that is much higher than that of the catalysts used in the inventive process and thereby having a high cracking activity. Thus, the hydrogenation/acidity ratio is low, and aromatic compounds are not hydrogenated but cracked instead, and this zeolite combination is thus more suitable for preparing gasoline than middle distillates. This is confirmed by the results in table II, which show that catalysts 2 and 3 provide increased activity for light gasoline with boiling point range 50-185°F (10-85°C) and naphtha within boiling point range 185-420°F (85-215°C) and for the lower end of middle distillates 300-550°F (148-288°C)".

The Applicant's argument is not persuasive because the claim requires 1-15% beta zeolite and 1-15% Y zeolite. Ward discloses 2.5-10 wt% beta zeolite and 2.5-10 wt% Y zeolite (See column 8, lines 26-32). Additionally, as discussed earlier, Ward uses silica: alumina molar ratio in the claimed range and Y zeolite having similar unit cell size as claimed (See Office action above under claim 1). Thus, there is no reason why Ward catalyst will have higher acidity, will cause cracking of aromatics and not hydrogenation, and produce more gasoline and not middle distillates. It is to be noted that Ward discloses, "Composition of the invention, when used to produce middle distillate

products via hydrocracking, have a higher activity and selectivity in single stage (in the presence of ammonia) hydrocracking, as compared to a commercial hydrocracking catalyst designed to maximize middle distillate yields" (Column 3, lines 33-39). Ward further discloses, "When the zeolite-refractory oxide particulates are used for selectively producing middle distillates in a hydrocracking process, they will typically contain 2.5 to 10 wt% of each of the zeolites" (Column 8, lines 26-32). Ward adds, "When middle distillates are the desired product, the hydrocracking operation conditions are selected to produce most preferably at least 80 volume% yield of 300-700°F middle distillate product" (Column 12, lines 19-25). Ward also discloses that the catalyst of the invention is useful for converting hydrocarbons into more valuable products by reactions including hydrogenation and dewaxing (See column 7, lines 47-55). Obviously, hydrogenation will cause reduction of aromatics and dewaxing will yield products with reduced pour point.

15. The Applicant argues,

"Ward discloses in table IV the selectivity vol. % converted to turbine fuel at activity temperature 300-550F (148C-287F) and to diesel at activity temperature 300-700F (148-371F), using catalyst 9. The selectivity vol. % for these two fractions shows that the amount of diesel formed from 550F to 700F corresponds to a selectivity vol. % of 5.7, which is very low, indicating that catalyst 9 is not suitable for producing heavy diesel, which is formed primarily at the high activity temperature. There is no mention of the aromatic content of the diesel prepared. Catalyst 9 of Ward is identical to catalyst 2, and there is no available information regarding the beta zeolite used in catalyst 2. However preferable silica-alumina values for the beta zeolite are 20-30 and the Y zeolite used in catalyst 2 has a silica-alumina ratio of 5.2, both values being much lower than the silica-alumina values of the catalyst used in the process of the claimed invention. Catalysts 2 and 9 are thus not identical to the catalyst used in the process of the

claimed invention, and they also are not able to produce high amounts of diesel. The process of the claimed invention provides a low aromatic middle distillate product with lower pour point. The lowering of the pour point is a distinct improvement and allows the end point of the diesel fraction to be, if not limited, increased significantly; thus, due to increased boiling range, the process of the claimed invention results in increased production of middle distillates. These advantages are neither disclosed nor suggested by Ward".

The Applicant's argument is not persuasive because as discussed earlier, Ward discloses catalyst comprising beta and Y zeolites with all the physical characteristics similar to that as claimed by the Applicant, conducts hydrocracking of similar feed stocks under similar operating conditions to produce middle distillates with reduced aromatics and lower pour point as claimed by the Applicant. Diesel is a part of the middle distillates. The claim does not require specifics of diesel.

16. In conclusion, the claimed invention is *prima facie* obvious over Ward.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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